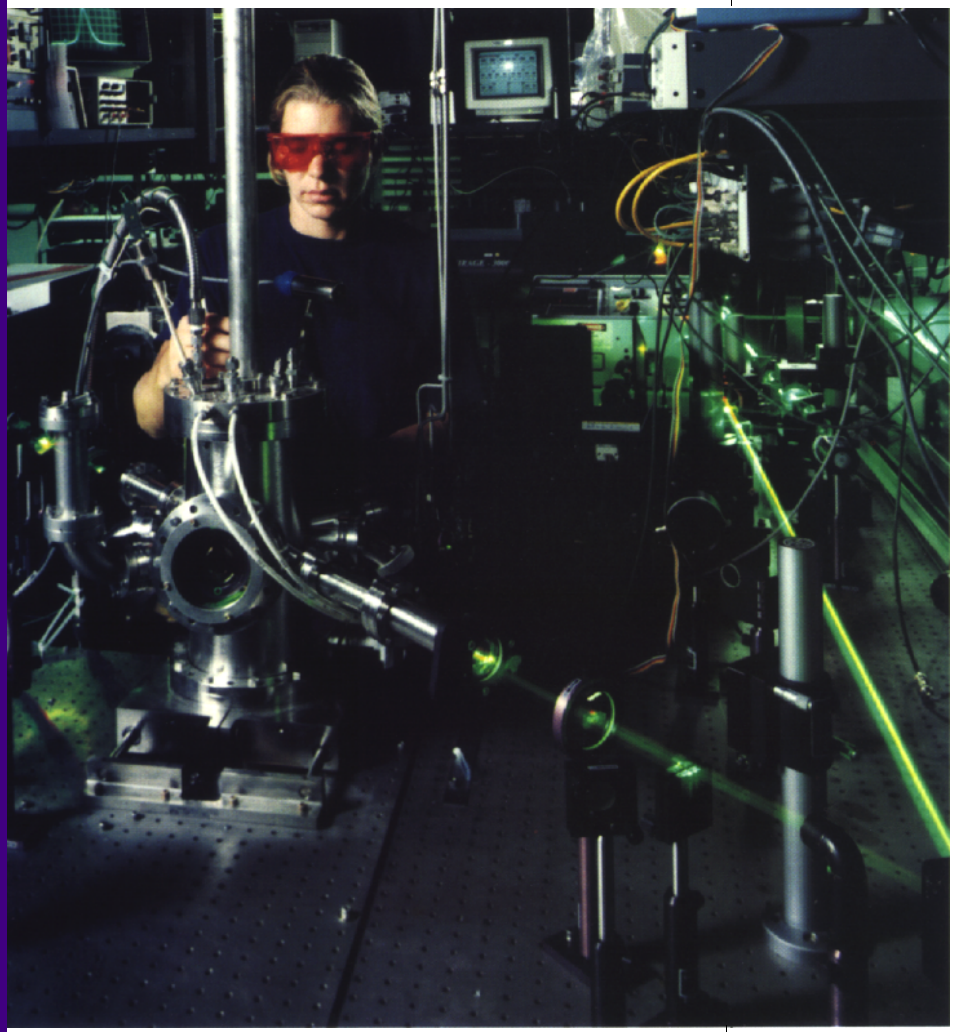
CRF

The Combustion Research Facility (CRF) at Sandia National Laboratories is a laboratory-office complex visited by about 1,000 researchers a year. Scientists use the CRF to better understand and control combustion processes. Projects underway range from fundamental studies of combustion generated pollutants, to development of new laser diagnostic techniques, to applied studies of processes in internal combustion engines.

About 25 percent of CRF customers are from American corporations. The other 75 percent come from universities and national laboratories. Research has resulted in the creation of new products and new companies. Technor and Electra-Optics Technologies were created to commercialize products developed at the CRF.



John Garman, a visiting researcher from the University of California at Irvine, adjusts experimental apparatus in the CRF's low-pressure flame laboratory.

The CRF houses 20 laboratories, including the Turbulent Diffusion Flame Facility, the Burner Engineering Research Laboratory, the Multi-fuel Combustor, and the Reaction Product Imaging Laboratory. Laser systems include Diana, a flash-lamp pumped dye laser used remotely for diverse applications throughout the facility.

Numerous other laboratories include facilities for chemical dynamics, chemical kinetics, spray combustion, imaging of turbulent reacting flows, internal combustion engine studies, supercritical water oxidation, and coal research.

Staff collaborate with scientists from industrial, academic, and government laboratories in joint research or to provide technical assistance. In addition, the CRF provides technical management of various combustion technologies programs supported by the Department of Energy Office of Energy Efficiency and Renewable Energy.

The CRF has about 40 resident professionals and 100 long-term visitors doing extensive experimental work. Each year, requests for experimental time at the CRF facilities exceed capacity by about 50 percent.

COMBUSTION RESEARCH FACILITY

INDUSTRIAL USERS

- American Iron and Steel Institute
- Arthur D. Little
- Babcock and Wilcox
- Beckman Instruments
- Chevron
- Chrysler
- Cummins Engine
- Dow Chemical
- Electric Power Research Institute
- Ford
- Gas Research Institute
- General Motors
- Metrolaser
- Mobil
- Petroleum Environmental Research Forum
- Technor
- 3M Corporation
- Unocal
- U.S. Army

ACCOMPLISHMENTS

Technor, a new company, was started as a result of RAPRENO$_X$, a CRF-discovered process that eliminates nitrogen oxides produced by combustion systems.

Reaction product imaging, a new technique developed at the CRF for investigating the dynamics of chemical reactions, has bee adopted in over a dozen research laboratories throughout the world

Scientists from Cummins Engine and the CRF applied in sit laser diagnostics to a Cummins diesel engine to study formation mechanisms of particulates. Continuing research at CRF has recently led to a new conceptual model for diesel combustion.

CRF scientists developed and patented a new technique called frequency resolved optical gating, or FROG, for characterizing ultrashort laser pulses. FROG is now licensed to Clark-MXR, Inc. and is an important part of its product line.

CRF researchers developed the ionization probe head gasket as a diagnostic tool for production engines. DSP Technologies is now manufacturing and marketing the gasket.

Two-dimensional laser-induced fluorescence images show the dramatically different character of flow patterns in nonreacting (left) and reacting turbulent jets.